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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/650,851	08/29/2000	Mandeep Singh Chadha	CHADHA 1-1-1-1	9885

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EXAMINER	
LIU, SHUWANG	

ART UNIT	PAPER NUMBER
2634	5

DATE MAILED: 10/27/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/650,851	CHADHA ET AL.	
	Examiner	Art Unit	
	Shuwang Liu	2634	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 August 2000* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-28* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-28* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *4* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Information Disclosure Statement

1. The information disclosure statement filed on December 04, 2000, fails to comply with 37 CFR 1.98(a)(2), which requires a legible copy of each U.S. and foreign patent; each publication or that portion which caused it to be listed; and all other information or that portion which caused it to be listed. It has been placed in the application file, but the information referred to therein has not been considered.

2. The listing of references in the specification is not a proper information disclosure statement. 37 CFR 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP § 609 A(1) states, "the list may not be incorporated into the specification but must be submitted in a separate paper." Therefore, unless the references have been cited by the examiner on form PTO-892, they have not been considered.

Drawings

3. The drawings are objected to because blocks 330 and 345 are not connected with other blocks shown in figure 3. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

4. The disclosure is objected to because of the following informalities: The examiner suggests changing "Reference Number" in the column 1 of the table on page 1 to corresponding application number.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bjarnason et al. (US 6,434,233) in view of Turner et al. (US 5,809,033).

As shown in figures 3 and 4, Turner et al. discloses a filter circuit and a method of configuring a filter circuit for use with a bit pump (figure 2) having a transmit (228) and receive path (210), comprising:

(1) regarding claims 1, 6-8, 13 and 14:

a noise prediction equalizer (318 or 418) configured to generate a noise prediction equalizer coefficient during activation of said bit pump to reduce an intersymbol interference associated with a receive signal propagating along said receive path (column 5, lines 13-51); and

a decision feedback equalizer (306 or 406) configured to generate a decision feedback equalizer coefficient during said activation of said bit pump to reduce said intersymbol interference associated with said receive signal, said noise prediction equalizer adapted to be concatenated with said decision feedback equalizer during showtime of said bit pump (column 5, lines 13-62).

Bjarnason et al. discloses all of the subject matter as described above except for specifically teaching to form a precoder associated with said transmit path as claimed in claims 1 and 8.

Turner et al., in the same field of endeavor, teaches a bit pump (figure 1) which has a precoder (25 in figure 1) associated with the transmit path and an equalizer (53). Furthermore, the precoder is a Tomlinson-Harashima precoder (25) as recited in claims 6 and 13 and comprises a plurality of taps (29) as recited in claims 7 and 14.

It would be desirable to remedy incompatibility problem by installing the Tomlinson precoder in the transmit section in order to have a high data rate and bandwidth efficient in the communication system (column 8, lines 7-20, Turner et al.). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to employ the precoder in the transmit path as taught by Turner et al. in the system of Bjarnason et al. in order to remedy incompatibility problem. In doing so, the system can reduce the intersymbol interference and noise associated with the received signal.

(2) regarding claims 2 and 9:

wherein said noise prediction equalizer (318 or 418) and said decision feedback equalizer (306 or 406) are couplable to a feed forward equalizer (304 or 404) during said activation of said bit pump.

(3) regarding claims 3 and 10:

wherein said noise prediction equalizer (318 or 418) and said decision feedback equalizer (306 or 406) are couplable to a slicer (310 or 410) during said activation of said bit pump.

(4) regarding claims 4 and 11:

wherein each of said noise prediction equalizer and said decision feedback equalizer inherently comprise delay lines associated therewith (see page 105, text book: Digital Communication, Bernard Sklar,1988 or column 6, lines 53-67).

(5) regarding claims 5 and 12:

wherein said noise prediction equalizer and said decision feedback equalizer inherently comprise noise prediction equalizer and decision feedback equalizer coefficient arrays respectively associated therewith (see page 105, text book: Digital Communication, Bernard Sklar,1988 or column 6, lines 53-67).

7. Claims 15-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Turner et al. (US 5,809,033) in view of Bjarnason et al. (US 6,434,233) and Norsworthy et al. (US 5,512,898).

As shown in figure 1, Turner et al. discloses:

(1) regarding claims 15, 20-22, 27 and 28:

a transceiver, comprising:

a framer (15) that formats signals within said transceiver;

a bit pump (17-65) coupled to said framer and having a transmit (TX) and receive path (RX), including:

a modulator (23), coupled to said transmit path, that reduces a noise associated with a transmit signal propagating along said transmit path (column 7, lines 42-50);

an analog-to-digital converter (43), coupled to said receive path, that converts a receive signal received at said bit pump into a digital format;

a filter circuit (25 and 53), wherein a precoder associated with said transmit path is formed; and

an echo canceling system (51), coupled between said transmit and receive path, that attenuates an echo in said receive signal.

Furthermore, the precoder is a Tomlinson-Harashima precoder (25) as recited in claims 20 and 27 and comprises a plurality of taps (29) as recited in claims 21 and 28.

Turner et al. discloses all of the subject matter as described above except for specifically teaching (A) a decimator, coupled to said analog-to-digital converter, that downsamples said receive signal propagating along said receive path; and (B) a filter circuit, including: a noise prediction equalizer that generates a noise prediction equalizer coefficient during activation of said bit pump to reduce an intersymbol interference associated with said receive signal, and a decision feedback equalizer that generates a

decision feedback equalizer coefficient during said activation of said bit pump to reduce said intersymbol interference associated with said receive signal.

With respect to item (A), Norsworthy, in the same field of endeavor, teaches a decimator (see inside 306 in figure 2) coupled to the analog-to-digital converter (220'), that downsamples the receive signal propagating along the receive path (column 10, lines 17-46).

It is well known that decimator is used to reduce the digital signal sampling rate of input digital signal in order to enable further processing of the digital signal. It would be also desirable to remove the noise beyond the Nyquist frequency without alias by using the decimator to lower the sampling rate to the Nyquist rate. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to employ the decimator as taught by Norsworthy et al. in the receive path of Turner et al. in order to lower the sampling rate to the Nyquist rate. In doing so, the noise beyond the Nyquist frequency is removed.

With respect to item (B), Bjarnason et al., in the same field of endeavor, teaches a filter circuit comprising:

a noise prediction equalizer (318 or 418) configured to generate a noise prediction equalizer coefficient during activation of said bit pump to reduce an intersymbol interference associated with a receive signal propagating along said receive path (column 5, lines 13-51); and

a decision feedback equalizer (306 or 406) configured to generate a decision feedback equalizer coefficient during said activation of said bit pump to reduce said

intersymbol interference associated with said receive signal, said noise prediction equalizer adapted to be concatenated with said decision feedback equalizer during showtime of said bit pump (column 5, lines 13-62).

It would be desirable to adequately remove periodic interference from the equalized signal (column 2, lines 1-19) in order to increase the signal to noise ration and data rate. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to employ the filter circuit as taught by Bjarnason et al. to replace the adaptive equalizer in the receive path of Turner et al. in order to adequately remove periodic interference from the equalized signal. In doing so, the signal to noise ration and data rate will be increased.

Furthermore, Bjarnason et al. teaches:

(2) regarding claims 16 and 23:

said noise prediction equalizer (318 or 418) and said decision feedback equalizer (306 or 406) are couplable to a feed forward equalizer (304 or 404) during said activation of said bit pump.

(3) regarding claims 17 and 24:

said noise prediction equalizer (318 or 418) and said decision feedback equalizer (306 or 406) are couplable to a slicer (310 or 410) during said activation of said bit pump.

(4) regarding claims 18 and 25:

each of said noise prediction equalizer and said decision feedback equalizer inherently comprise delay lines associated therewith (see page 105, text book: Digital Communication, Bernard Sklar,1988 or column 6, lines 53-67).

(5) regarding claims 19 and 26:

said noise prediction equalizer and said decision feedback equalizer inherently comprise noise prediction equalizer and decision feedback equalizer coefficient arrays respectively associated therewith (see page 105, text book: Digital Communication, Bernard Sklar,1988 or column 6, lines 53-67).

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shuwang Liu whose telephone number is (703) 308-9556.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Chin, can be reached at (703) 305-4714.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks

Washington, D.C. 20231

or faxed to:

(703) 872-9306 (for Technology Center 2600 only)

Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal Drive, Arlington, VA, Sixth Floor (Receptionist).

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Technology Center 2600 Customer Service Office whose telephone number is (703) 306-0377.

Shuwang Liu
Primary Examiner
Art Unit 2634

October 16, 2003